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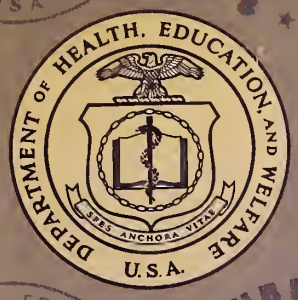

Serving Health Research

THE MISSION OF THE DIVISION OF RESEARCH FACILITIES AND RESOURCES OF THE NATIONAL INSTITUTES OF HEALTH

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U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE ■ PUBLIC HEALTH SERVICE
National Institutes of Health, Division of Research Facilities and Resources, Bethesda, Maryland 20014

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Foreword

The Division of Research Facilities and Resources at the National Institutes of Health provides a focal point for the administration and management of broad NIH programs intended to supply a wide institutional base of support for health-related research.

The Division's principal concern is to aid institutions in the construction of new and remodeled medical research facilities; help them establish and operate a number of general clinical research centers where research studies can be conducted on patients over a wide range of human diseases; supply a variety of unusual and highly specialized research services and equipment; increase the availability of laboratory animals including unusual species and special strains; and stimulate well-balanced institutional research programs through grants for general medical research support.

In short, a unified approach is being sought to solve the many complex needs of health-oriented research that tends to be institutional, regional or national in scale. It is expected that these programs will stimulate new vision and leadership in medical research and yield substantial benefits in better health for everyone.

SEPTEMBER 1963

Frederick L. Stone, Ph. D., Chief, Division of Research Facilities and Resources

THOMAS CARLYLE
Sir Walter Scott

The National Advisory Council on Health Research Facilities guides the Division of Research Facilities and Resources in the administration of construction grants to bolster health-related research throughout the nation.

NIH programs to aid institutional health research and training

With the end of World War II, the Federal Government devoted ever increasing energy and resources to win victory over disease. Since 1946 the National Institutes of Health have strongly supported medical scientists in their systematic quest for facts and knowledge. As these programs developed within the Institutes and Divisions of NIH, it became increasingly clear that a number of basic services were needed which would transcend specific projects. Many of these were too diverse or too large to fit into the established mechanisms of research grants and projects. They were, nevertheless, essential to support vital facilities and resources involving a great variety of health research and many scientific disciplines at medical and dental schools, clinics and nonprofit research institutions.

In July 1962 these service programs were concentrated in the newly established "Division of Research Facilities and Resources." This Division, known as DRFR, comprises five branches, each assuming a special responsibility to support research and research training in many categories and disciplines. This support is given either to institutions directly or on a regional basis.

Thus a DRFR supported General Clinical Research Center can provide facilities for research of interest to specialists in heart, cancer, child development, neurology, infectious diseases, or any other branch of medical science. A Computer Resource can furnish computational assistance to every department of a private or public medical institution or to several institutions. An Animal Research facility can supply hard-to-obtain animals and participate in the national program of laboratory animal research. A General Research Support award provides for the integration and balance of research activities in institutions heavily engaged in health-related research. Construction of housing for any of these activities is possible through one or more Health Research Facility grants.

Three new health research facilities, partly financed through NIH funding programs.

Samuel J. Wood Library and Research Building, Cornell University Medical College, New York City.

Medical Research Building, University of Oregon Medical School, Portland, Oreg.

HEALTH RESEARCH FACILITIES (CONSTRUCTION)

This activity provides matching funds, not to exceed 50 percent on the part of the Federal Government, for construction of facilities to be used for research in the sciences related to health. To be eligible for support, an institution must be either a non-Federal public or a nonprofit private organization competent to conduct the type of health related research for which a structure is designed.

The program began in 1948–50 when federal funds were first made available as an outgrowth of needs related to the NIH heart and cancer research programs. It has been a popular program from the beginning, though in the face of more demanding needs during the Korean action, it was temporarily discontinued.

Formal authorization came through passage of Public Law 84–835, which added Title VII to the Public Health Service Act. Since then the act has been amended several times to extend its time limitation and to increase its annual authorization level from $30 million to $50 million.

During the past seven years, the Congress has appropriated $230 million for this program. This has been disbursed through 1,039 grants to 369 institutions in 49 States, the District of Columbia and Puerto Rico. On an institutional basis the largest amount, $117,588,467 has been used to provide research facilities in medical schools. Dental schools received $2,953,415; schools of osteopathy $5,469 and schools of public health, $6,231,978. Research facilities for other health-related schools, such as pharmacy, veterinary medicine, chemistry, and the biological sciences received $55,739,123; and other public and private institutions engaged in health-related research (principally hospitals) received $47,349,103. Of these funds, 46 percent has been allocated to non-Federal public institutions and 54 percent to private nonprofit organizations.

Science Center at Georgetown University.

Institutions receiving grants for the construction or remodeling of research laboratories have been surprised again and again to find that the impetus gained from federal backing attracted much additional support from unexpected public and private sources. The end result has been the accelerated construction of research buildings worth more than four times the original federal participation. This healthy, advantageous trend is expected to continue. The need is particularly noticeable at universities and other institutions of higher learning, where much basic scientific research is accomplished and successive generations of researchers are born and nurtured.

Federal support for the construction of research facilities in certain "other fields" allowed in the law, is reflected only slightly in the figures given above. Thus, only a few applications for facilities in areas such as special research resources laboratories, biomedical engineering and computer resources, are included. It is anticipated that for the next few years much of the available support will be needed for construction of general clinical research facilities, biocomputer resources, animal centers, and for specialized centers for the management of health data and communications. Substantial additional needs are anticipated for facilities to house research and re-

lated activities in the important fields of environmental health, mental health, cancer chemotherapy, and other emergent areas. Throughout the years this program has been in existence, evidence has accumulated indicating a long range urgent need for new research space. Early estimates of need were entirely too conservative. Competition for available funds is intense and each year many Council-recommended applications equally worthy of support from the standpoint of health research merit, must await the availability of additional authorized and appropriated funds.

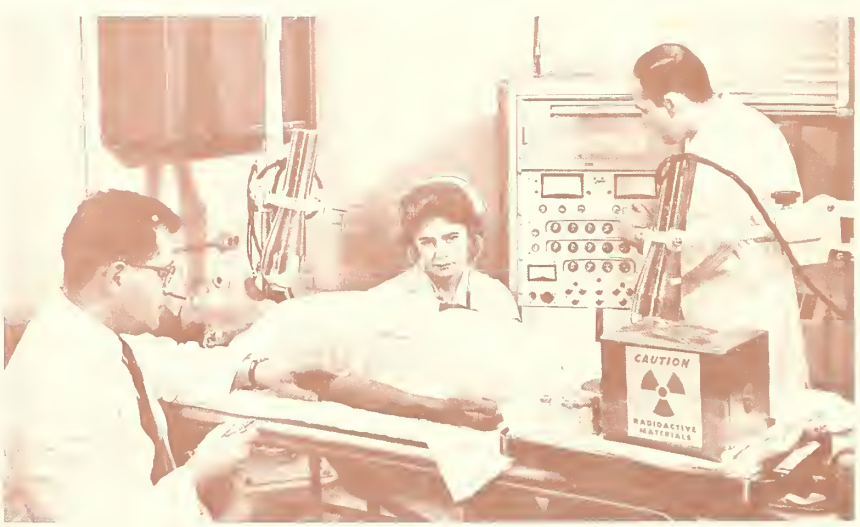
GENERAL CLINICAL RESEARCH CENTERS PROGRAM

Grants established through this program are intended to improve and intensify clinical investigation in order to advance mastery over the diseases of man and add to our storehouse of biomedical knowledge. The program was started in the fall of 1959 following recommendations by Congress in connection with the F.Y. 1960 Appropriations Act.

As of May 1, 1963, 56 institutions in 27 States, the District of Columbia and Puerto Rico, have received assistance for 64 different General Clinical Research Centers with a total of about 800 beds. Forty-one centers with 557 beds are admitting patients. Of the 64 awards, 30 are associated with private institutions, 20 are state sponsored, 13 are city and county supported and one is church supported.

All awards made through this activity are reviewed and recommended by the General Clinical Research Center Committee and the Council. In addition to funds for the remodeling of areas to be used as Clinical Research Centers, provision is also made for equipment, special laboratories, diet kitchens, salaries for highly trained staff, and for the hospitalization costs of research patients. Salaries for research scientists and the cost of studies which are to be carried out in association with the clinical research centers or in the research scientist's own laboratories, are supported by funds from other sources.

As a discrete unit in a hospital, a General Clinical Research Center is a ward of 6 to 30 beds set apart from general care wards. Each unit may have its own paramedical staff, laboratories, and diet kitchen. In size they have ranged from 2,500 to 15,000 gross square feet. Unlike a categorical research center in which studies are focused on one disease such as cancer, or on



Clinical Research Centers—discrete units within a hospital complex enabling discoveries of the laboratory to be extended to patients under rigidly controlled conditions. In the General Clinical Research Center, Washington University School of Medicine, St. Louis, Mo.: radioisotopes are being used to measure the function of a patient's thyroid gland.

Measuring distilled water in the special diet kitchen, an integral part of the General Clinical Research Center, University of Florida at Gainesville. This is one of many general clinical research centers throughout the nation, working under Public Health Service grants administered by the NIH Division of Research Facilities and Resources.

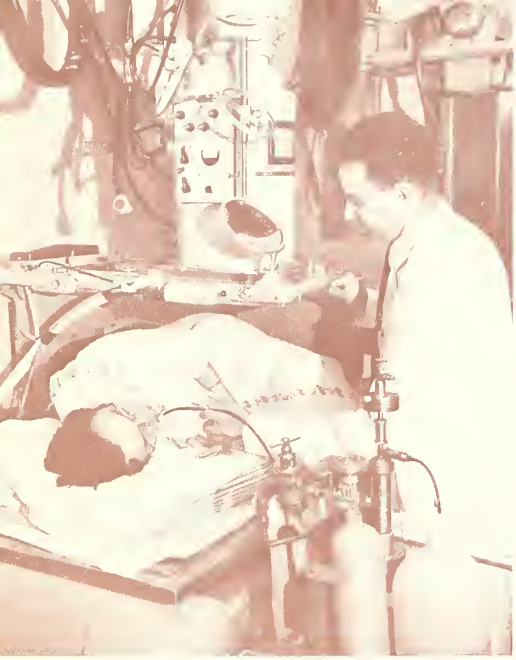
one broad area such as aging, a General Clinical Research Center is for studies on a variety of human diseases over a wide range of basic clinical scientific problems.

The different kinds of general clinical centers included within the current program are concerned with different populations of patients which directly affect the nature of the facility and equipment needed. Fifty-one are for adults, eleven are children's centers, one is a prematurity center and one a center for acute studies only. The latter is at Albert Einstein College of Medicine and is concerned with shock, trauma, burns, sepsis, and pre- and post-operative studies. Its work may also involve portions of the facility directly related to the operating room or the emergency room, as well as require special monitoring equipment.

In hospitals where these centers are situated, scientists from many departments correlate their laboratory studies with rigidly controlled clinical observations and analyses. Each center is operated as a full-fledged institutional resource and it is left to each institution to take all reasonable precautions to ensure that research programs accepted for study are worthwhile, offering reasonable expectations for the gain of useful knowledge.

Administration at these Centers is accomplished through program directors working with interdepartmental advisory or supervisory committees appointed by the sponsoring institution. Each is required to administer its policies so that high standards of medical ethics are maintained and that patients admitted in connection with research projects receive the finest of patient care. Extraordinary teamwork is essential, involving hospital administration and staff, scientific and medical investigators, and medical school administration.

As part of the research team, patients are carefully chosen and play an important role. Each is admitted to a clinical research center only after a research protocol has been accepted by the supervisory committee of the General Clinical Research Center. Each patient is chosen because of



The nature and causes of celiac-sprue disease of the small intestine is a principal research subject at the University of Washington Clinical Research Center. Special X-ray equipment is used to check the position of a swallowed biopsy tube in a patient's small intestine.

some special contribution he can make to a specific research area, and the length of stay depends on the time needed to carry out the study.

Some idea of the variety and extent of research conducted in these centers can be gained by examining the report of one that in a single year admitted 220 patients and afforded research opportunities for 23 investigators from eight different departments of its sponsoring medical school. They conducted studies in endocrinology, metabolism, immunology, trauma, neurosurgery, preventive medicine, cardiovascular, genetics, hematology, gastroenterology, cancer, physiology, and neurology. Medical students, residents, and postdoctoral fellows worked with some of the investigators, by whom they were trained in methods of clinical research.

Approximately three years have passed since the first awards were made in May 1960. The program is still undergoing revisions in its policies and guidelines. While these have changed and will be under continuing review for additional modification as new experence is gained, the basic concept of the program as centered around discrete, multidepartmental, multicategorical facilities, operated by institutions qualified to conduct meritorious clinical investigations, remains unaltered.

The impact of these Centers has proved to be very important nationally. Apparent to all those working with this program, is the tremendous surge of enthusiasm engendered by the new opportunities and challenges offered not only for the advancement of clinical research, but also for progress in patient care, and for improvement in medical education and training.

GRANTS FOR GENERAL RESEARCH SUPPORT

The purpose of the General Research Support Grant is to provide flexible and discriminating general support on a continuing basis to eligible institutions within the United States for research and research training in disciplines of science relating to health.

These awards are specifically expected to cultivate scientific excellence and to improve the overall quality and strength of institutions in the conduct of health-related research and research training. Therefore, great latitude is permitted qualifying institutions in their determination of the quality, content, emphasis and direction of such research activities. They are encouraged to capitalize on emerging opportunities, to explore new and unorthodox ideas, and to employ these funds for purposes which their judgment leads them to believe will contribute most effectively to the improvement of their total research capabilities.

Grants are made by the Surgeon General following recommendations by the National Advisory Research Resources Committee, to schools of medicine, dentistry, osteopathy, public health, pharmacy, nursing, veterinary medicine, hospitals and other nonprofit research organizations heavily engaged in health-related research.

The program began in July 1961 with grants to schools of medicine, dentistry, osteopathy and public health. In 1962 eligibility was extended to include schools of pharmacy, nursing, veterinary medicine, hospitals and other nonprofit research organizations within the United States. Under most circumstances, research project grants from the National Institutes of Health totaling $100,000 or more are considered as indicative of being "heavily engaged." There are in addition, other criteria of a judgmental nature, such as: total research activity of an institution and complexity of the various research projects or programs concerned.

University of Chicago used NIH general research support to add four new professors to its staff. Shown below are (L–R) Dr. Humberto Fernandez-Moran, former head of the department of biophysics at the University of Caracas and founder-director of the Venezuelan Institute for Neurology and Brain Research, now professor of biophysics; Dr. Roger Lester, Thorndike Memorial Laboratory research fellow, now assistant professor of medicine; and Dr. Rudi Schmid, professor of medicine and director of the University of Chicago's new Chronic Disease Research Laboratories. Dr. Ronald Singer, the fourth member of the group, formerly a member of the faculty of medicine at the University of Cape Town, South Africa, now professor of anatomy at Chicago, was abroad at the time this photograph was made.

General Research Support Grants directly support health related research and research training, provide additional research resources or research personnel, or support certain activities formerly covered by other Public Health Service Grants (such as grants for less than $2,000 per year, and student part-time and post-sophomore fellowship programs). They are not for new construction, alterations, or renovation; nor should they be considered as simply a source of funds available for unplanned expenditures.

Each General Research Support grant is computed according to a formula whose factors depend in large measure upon the total health related research expenditure of the applicant institution in its latest complete fiscal year; the amount of federal and nonfederal grants, contracts or gifts it received; and the total amount of available NIH funds for research and research training. (To ensure a minimum financial base for extending its research and research training program, each eligible educational institution receives a predetermined basic amount.)

To cite a few examples of accomplishments during the first year of the program:

One large school established and staffed a new experimental endocrinology laboratory. (Within a year or so, salaries paid from the grant will be picked up by the university budget, thus releasing the General Research Support Grants funds for other research activities.) This school also provided and staffed a new animal surgery for research, added a health physicist to the staff, established an instrument development shop and undertook a pilot study on the breeding of animals for research.

Another school was able to appoint three research professors (in anatomy, biophysics and human genetics), and increased the research potential of several able, permanent members of the faculty by putting them on a twelve months' salary instead of the usual nine.

A third school established three new divisions of wholly independent research activities: a Division of Molecular Biology in the Department of Biochemistry; a Division of Neurophysiology; and a Division of Genetics in the Department of Microbiology.

GRANTS FOR SPECIAL RESEARCH RESOURCES

Project grants supporting Special Research Resources will provide unusual or specialized services required by institutions for research in medical and related sciences. Such support can be in the nature of instrument and electronic development, computing and data processing, biomedical engineering, resources in tissue research, enzyme and biopolymer supply, scientific and technical information services, or certain other highly specialized scientific efforts currently under development. It is not intended however, that this program shall provide for research or training which can be obtained through the usual NIH programs.

For example, a number of remarkable tools and techniques have been developed in the physical sciences in recent years, but only very recently have some of these advances been applied to biomedical research. Part of the delay is owing to the fact that large-scale equipment is complex, expensive, and requires highly trained personnel to operate and maintain. There is no doubt now but that computers can increase enormously the potential of biomedical research, permitting complex measurements, and analyzing data with extraordinary speed and accuracy. They have proved to be especially productive for researchers in fields such as epidemiology where great dependence is placed on massive data collection, processing and analysis. They also have served importantly in genetics, nutrition and the behavioral sciences. To purchase such equipment for one scientist would be prohibitive and impractical, but purchase for use by many scientists in a variety of fields, and by investigators in neighboring institutions and agencies, is sound research economy.

Therefore, the principal goal of the Special Research Resources program is to provide such large-scale resources to areas of major multidisciplinary, multicategorical research endeavor. In this way, goals previously thought impossible to attain, can be added to the research plans of outstanding institutions. Another important function of the program is to facilitate advanced, on-the-job technological training for needed specialists.

Proposed Special Research Resources should meet not only a clearly defined institutional need, but should be an integral part of the general plan of development of the applying institution. The Public Health Service

The LINC (Laboratory Instrument Computer), heart of a cooperative program at the Massachusetts Institute of Technology sponsored by National Institutes of Health and the National Aeronautics and Space Administration, is a small stored-program digital computer designed to accept analog as well as digital inputs directly from experiments. Data are processed immediately and signals provided for the control of experimental equipment. Information typed on the keyboard and displayed on the scope is simultaneously stored in the central memory.

Parkinsonism in its most severe form reduces its victim to a trembling, quivering state, with much of the body immobile. Recently developed brain surgery techniques greatly lessen the effects of the disease. At the NIH-supported Biomedical Engineering Center, Northwestern University, a physician-engineer team has made it possible for the brain surgeon to work with greater assurance that he has hit exactly the right spot in the brain and not damaged others.

supports Special Research Resources as a program designed to expand in a rational and effective way the total research capability of the Nation.

The program began with an authorization of $5 million for computer centers for Fiscal Year 1962. By July 1, 1962, a number of large centers were established and research was started in support of investigators in the basic biomedical sciences. Much of this effort involved research in scientific information storage and retrieval.

On June 1, 1963, the DRFR Special Research Resources program consisted of 18 approved grants projects, 17 of which were computer centers and one, a biomedical engineering facility. In addition, contracts were let or were under discussion for such projects as a Center Development Office for Computer Technology in the Biomedical Sciences, a New England Enzyme and Biopolymer Resource, and a Resource for Tissue Cultures.

Medical science as a whole can profit by concentrating a variety of interrelated techniques on a basic problem. There are obvious advantages, for example, to an attack upon the structure of proteins in living cells using such physical methods as X-ray crystallography, ultrasound, and other physical techniques in combination with skilled biochemical technology. Such a Resource in physical biology could provide the highly trained technical staff as well as sophisticated and costly apparatus for supported research in this direction.

ANIMAL RESOURCES BRANCH

Prime objectives of the Division's Animal Resources program are to plan, implement and establish a national effort to provide animals of the kind and in quantities needed for all branches of specialized medical research. At the same time, higher standards of producing and maintaining the various species and special strains of animals used in biomedical and health-related research will be attempted through the use of all mechanisms available in the Public Health Service, including the establishment and maintenance of such resources and centers as may be found necessary to achieve these goals.

Biomedical research using animals as laboratory tools with which to gain new knowledge has been so successful that to attempt to do research without them is unthinkable. Essential contributions made toward the conquest of such diseases as malaria, tuberculosis, yellow fever, diabetes, diphtheria, tetanus, polio and most recently, measles, can be directly attributed to experimental work with animals. They are currently making it possible for geneticists to evaluate new theories, and for others to study susceptibility to environmental influences, nutrition problems, neurological and immunological diseases, aging, new drugs, new surgical techniques, and the impact of radiation upon our lives—to mention only a few. Yet figures from a number of sources are available to show that millions of animals are needed in the United States for such purposes each year and not nearly enough of the desired kinds are available.

A small squirrel monkey wearing a constant amplitude transistorized receiver unit for remote brain stimulation. This allows the animal complete freedom of movement without the hazards of attached electrode wires.

Thus far, the Animal Resources program maintains seven Regional Primate Research Centers with one each in Oregon, Wisconsin, Washington, Georgia, Louisiana, Massachusetts and California. The program was started in 1959 on recommendation of the National Advisory Heart Council, and until July 15, 1962, was administered by the National Heart Institute.

Although no animal provides an exact counterpart to man, investigations with subhuman primates present many physiological and biochemical similarities. Detailed observation of the rhesus monkey, for example, makes possible the study of many vital characteristics and points up their relationship to problems of human development, disease and degeneration. Scientists at the primate centers will study the hereditary and developmental aspects of disease. Investigations will include the physiology and biochemistry of the fetus and newborn, fetal skeletal biochemistry and growth, congenital abnormalities, neurophysiology, gastrointestinal physiology, skeletal and dental development, obesity, postnatal development of the primate brain, and cardiovascular physiology and pathology. At the Oregon Center, unique outdoor-indoor animal buildings have been completed, and there, much research involving the rhesus monkey has already begun.

The Center at Davis, California, is a primate conditioning establishment for studying the subhuman primate in terms of procurement (including capture), transportation, general handling, conditioning and maintaining healthy colonies, and identifying and evaluating the suitability of various species and genetic strains for particular medical research purposes.

In addition to the work with primates, the Division program calls for providing a wide variety of other animals badly needed in a number of areas of specialized medical research. For many of these the margin of profit is too small and the risk too great to interest commercial suppliers. Included are many rare or highly inbred animals of strains difficult to develop or maintain, many isogenic or genetically homogeneous stocks.

Oregon Regional Primate Research Center.

Animal facilities at the University of Florida, Gainesville, provide housing for primates used in biomedical research. The structure, containing laboratories, animal cages and runways, darkrooms, X-ray apparatus and other equipment, was built by the University with federal matching funds.

An extension of the current program will thus include construction and renovation of other types of animal research centers and the encouragement of research into basic problems concerned with the general care and treatment of laboratory animals and their diseases. Another DRFR objective is the encouragement of postdoctoral training for professional personnel in all research phases of laboratory animal medicine.

In Summary

The principal objectives of the Division of Research Facilities and Resources are to stimulate new research in the health-related sciences, to provide supplementary aid to them, and to stimulate productive research by providing the proper research environment.

A medical school or other institution already heavily engaged in health-related research can thus plan for construction of a new research wing, expand its research staff, obtain service from a computer resource, increase its access to needed laboratory animals, establish a general clinical research center, and obtain an award for health-related general research support—all in one coordinated move. And it can present this plan to a single NIH Division. All these needs can be considered as a "package." They can be met with equally comprehensive assistance commensurate with the progress and intellectual capacity of the institution.

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Institutions or investigators who would like to discuss matters pertaining to the foregoing programs, are invited to write to the Chief, Division of Research Facilities and Resources, National Institutes of Health, Bethesda, Md., 20014.

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